

NAVAL SEA SYSTEMS COMMAND

What's New in Nonskid?



NSRP SPC Panel Meeting
Pittsburgh, PA
September 2018

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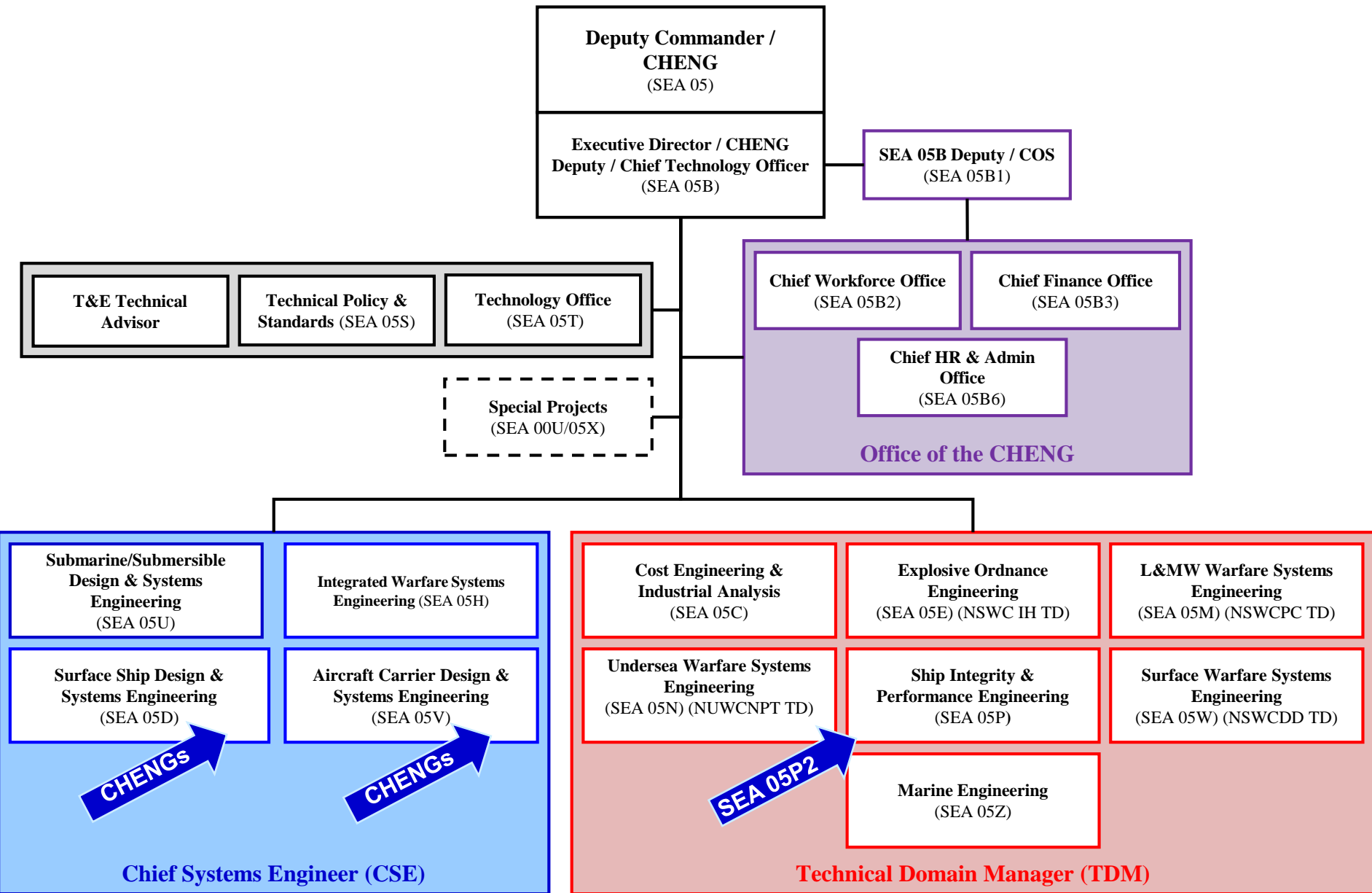
OBJECTIVES

- Summarize evolving Naval Sea Systems Command (NAVSEA) organization and coating requirements:
 - Headquarters NAVSEA organization & objectives.
- Summarize **what's new** in NAVSEA nonskid and maintenance coating cost reduction strategies:
 - Large-scale demonstration of thermal spray nonskid (TSN).
 - Large-scale installation of new Composition D nonskid.
 - In-service demonstration of spray applied polysiloxane.
- Discuss ongoing MIL-PRF-24667 specification update and solicit NSRP SPC input on NAVSEA efforts to clarify nonskid material types to reduce costs and ensure nonskid supports operational requirements.



Naval Systems Engineering Directorate (SEA 05)

Draft: Sep 2018



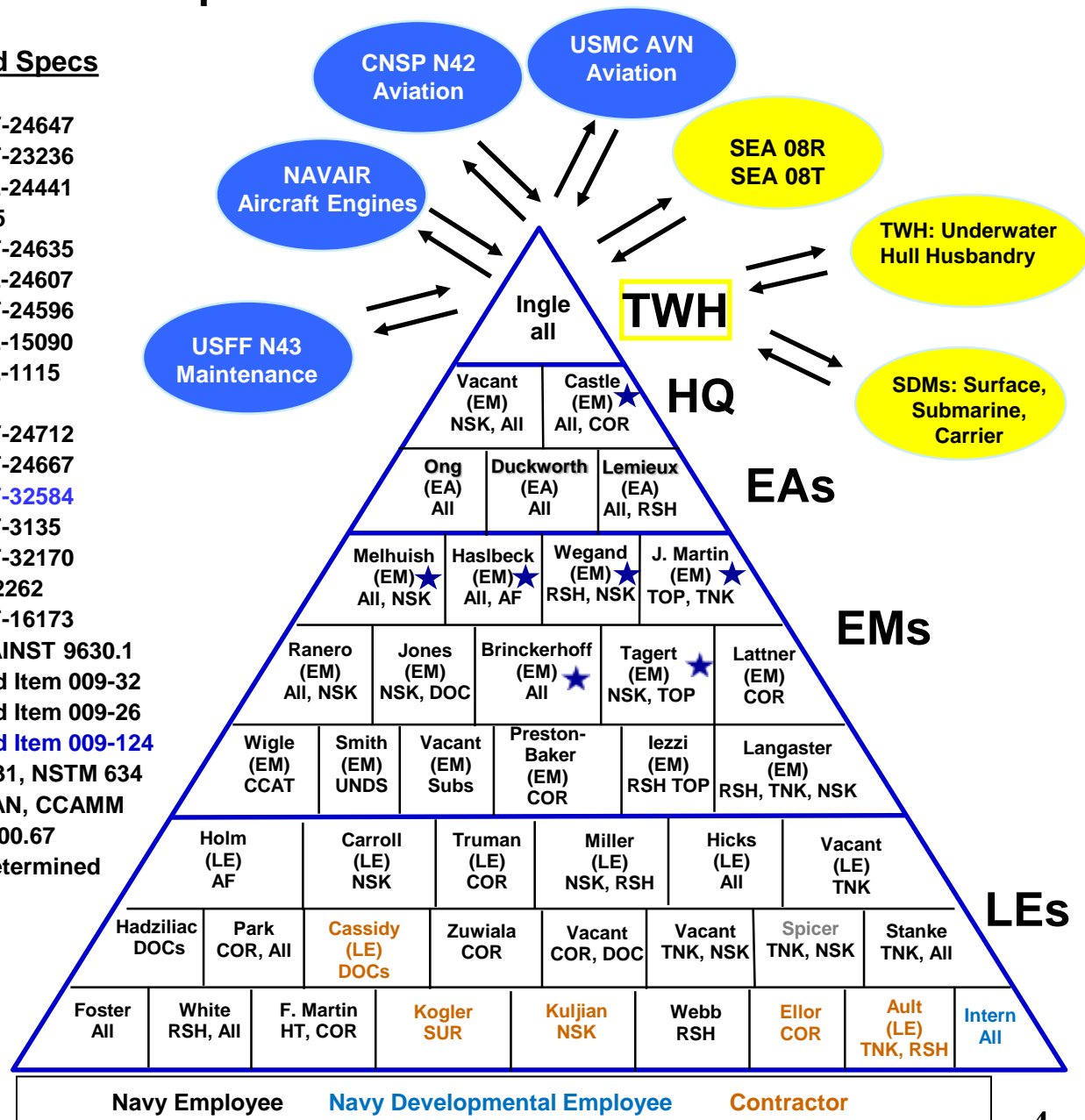
Technical Authority Pyramid - Coatings & Corrosion Control

Draft: Sep 2018

Code	Product	Related Specs
All	All Technical Products, Managerial	All
AF	Antifouling Coating Systems	MIL-PRF-24647
TNK	Tank Coatings, Epoxy Primers	MIL-PRF-23236 MIL-DTL-24441
PRM	Primers, Single Component	TT-P-645
TOP	Topside, Alkyds & Polysiloxanes	MIL-PRF-24635
INT	Interior Coatings (SEA 08)	MIL-DTL-24607 MIL-PRF-24596 MIL-DTL-15090 MIL-DTL-1115
HT	High Temp Coatings, Metallic	TT-P-28
PWD	Powder, Interior, Cosmetic	MIL-PRF-24712
NSK	Nonskid	MIL-PRF-24667
DCK	Deck Coverings (monolithic)	MIL-PRF-32584 MIL-PRF-3135
DCK	Deck tile	MIL-PRF-32170
SUR	Abrasive blasting, surface prep	MIL-A-22262
SEL	Sealants & Preservatives	MIL-PRF-16173
DOC	Application / Policy Documents	NAVSEAINST 9630.1 Standard Item 009-32 Standard Item 009-26 Standard Item 009-124 NSTM 631, NSTM 634 S636-MAN, CCAMM
COR	Corrosion/PCOE Policy/Design	DODI 5000.67
RSH	Research & Development	To be determined
UNDS	Regulations, Underwater hull	TBD



Delegated signature authority



Leadership Challenge

Improve Overall Nonskid Performance

- Mar 2017 – Senior NAVSEA / NAVAIR leadership task Flight Deck Readiness Working Group (FDRWG) to improve all aspects of flight deck nonskid service life. FDRWG includes:
 - SEA 05P2, NSWC-PD, NRL
 - SEA 21
 - Fleet Forces
 - NAVAIR technical community
 - Type Commander
 - USMC Aviation
- Nonskid must consistently achieve **required service life** while satisfying **all MIL-PRF-24667C performance requirements**.

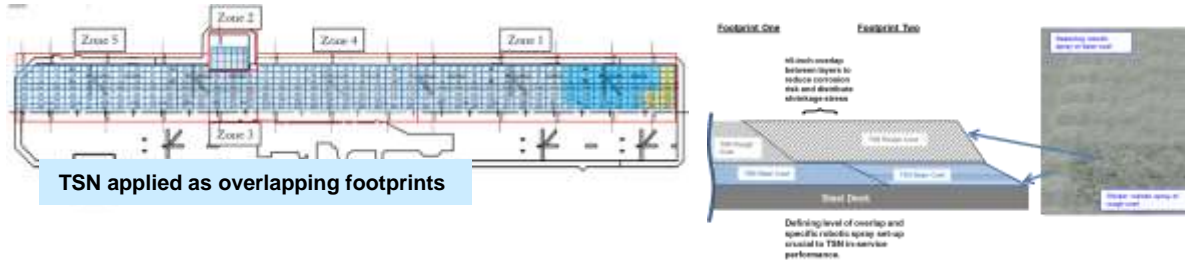


[Flight Deck Readiness Working Group tasked to improve nonskid service life and performance on all platforms.](#)

Large-scale Thermal Spray Nonskid (TSN) Installation

PLAN: New construction shipbuilder to install TSN in accordance with following:

1. NRL provide on-site personnel to ensure coatings applied in accordance with recently published FY-18, Standard Item 009-124, "Thermal Spray Nonskid Application; accomplish"

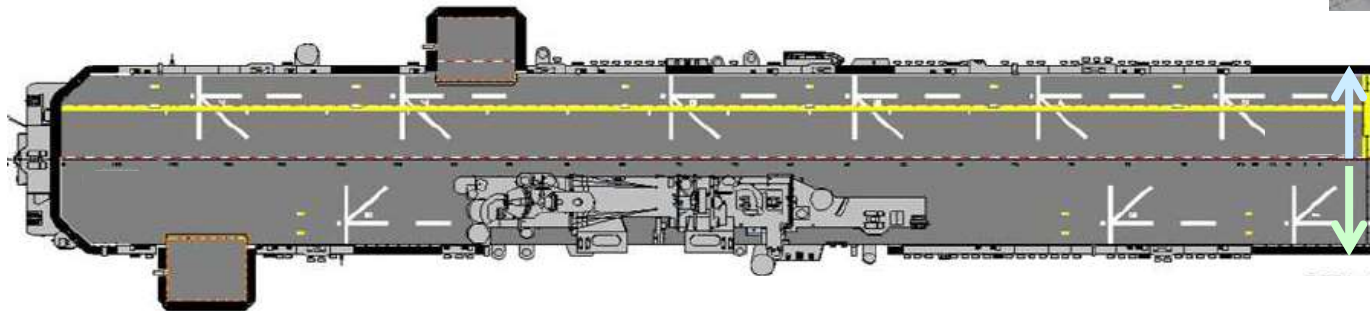


TSN applied as overlapping footprints



Interior of large containment

2. TSN applicator to have demonstrated ability to apply TSN in accordance with Technical Publication Technical Publication 1687, "THERMAL SPRAY PROCESSES FOR NAVAL SHIP MACHINERY APPLICATION"
3. TSN material to be qualified to MIL-PRF-32577, "COATING SYSTEM, NONSKID, METALLIC THERMAL SPRAY APPLICATION" Chromium-free TSN wire installed, **not yet qualified to MIL-PRF-32577.**
4. Color topping to be new, single-pack, flat, polysiloxane N-10126 over clear polysiloxane N-10114 seal coat. **Trade-name specific products installed pending update to MIL-PRF-24667.**



TSN installed port side of foul line

MIL-PRF-24667, lightweight epoxy nonskid, starboard side

Total TSN area applied to port side of foul line is $\approx 40,000 \text{ ft}^2$

Thermal Spray Nonskid Standard Item 009-124 Process Includes Eleven Government QA Checkpoints

1. (V) (G) "CONTAINMENT AND VENTILATION INSTALLATION"

Process requires environmental controls on temperature, humidity, and dust. → Design approved by SUPERVISOR per Standard Item 009-01, 009-03, 009-05, etc. Re-establishment of containment across deck is contractor verification point (V). Environmental requirements are 55-90°F ambient temperature, >50°F deck temperature, Relative humidity <70%, deck temperature >5°F above the dew point as trades person verification point (V).



2. (I) (G) "CONDUCTIVITY MEASUREMENT"

Conductivity required (i.e., there are no separate chloride limits) using Bresle or equivalent method. One reading from first 200 ft²/subsequent 400 ft² with limit of 30 micro-siemens/cm. → Requires low pressure waterjet cleaning of any areas with high conductivity.



3. (I) (G) "CLEANLINESS PRIOR TO ABRASIVE BLASTING"

Clean and degrease surface by SSPC-SP 1 before surface preparation, requires verification → using water break test. One water break test is required for every 200 ft².



4. (I) (G) "SECONDARY SURFACE PREPARATION"

Requires SSPC-SP 5 white metal blast on both general deck surface → and welds using requirements in SURFACE PROFILE section.

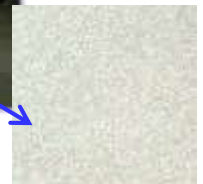


5. (I) (G) "SURFACE PROFILE"

Measures profile on the SSPC-SP 5 white metal level of cleanliness created using 50/50 mixture of 16- to 24-grit virgin Al₂O₃ abrasive during surface preparation within 10 hours of removing old nonskid using very thorough water jet cleaning to SSPC-WJ 2.

Verifies compressed air cleanliness.

Requires ASTM D4417 Method B for profile peak height and ASME B46.1 for profile → texture. Profile shall be between 4.0 and 10.0 mils and texture by root mean square (R_{Aq}) >0.45 as measured on first 200 ft²/subsequent 400 ft².



Thermal Spray Nonskid Standard Item 009-124 Process Includes Eleven Government QA Checkpoints

6. (I) (G) "DUST TEST"

Requires ISO 8502-3 (Rating 2, Class 2) with "just visible" particles no larger → than 40 mils with three readings per 400 ft².



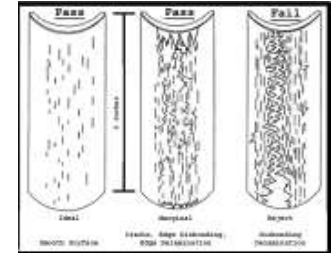
7. (I) (G) "THERMAL SPRAY APPLICATION MACHINE SETTINGS"

Requires robot settings are same as those used in Technical Publication 1687 process. → Check and validate settings at start of work shift.



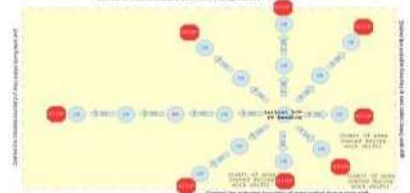
8. (I) (G) "MANDREL BEND WITNESS PANELS"

Requires three witness panels attached to tie downs to be removed from deck after first TSN coat and bent → 180° over a 2 ¼ inch mandrel at start of each work day. Only slight edge cracking allowed.



9. (I) (G) "FILM THICKNESS MEASUREMENTS"

Requires film thicknesses demonstrated in Technical Publication 1687 process → to be measured using modified SSPC-PA 2 method to take five spot spot per every 200 ft² and to locate and repair thin areas on a +/- 3 inch basis.



10. (I) (G) "TSN CLEANLINESS"

Requires wire brush, dry vacuum, or low pressure, vacuum water cleaning, → at 2,500 to 3,000 psi, to clean dust off deck before color top.



11. (I) (G) "COLOR TOPPING HOLIDAY INSPECTION"

Requires wet film thickness of color top and visual inspection of deck. → Requires dark gray and VLA marking colors to be applied direct to TSN. SUPERVISOR provides final approval of deck.



[Standard Item 009-32 has eight \(G\) points to ensure nonskid quality while Standard Item 009-124 has eleven \(G\) points.](#)

Standard Item 009-124

Hard Masking Lesson Learned

LESSON LEARNED: Use re-usable, steel, “Hard Masking” to preclude lateral TSN build up on welds of excess TSN material on welds. Reduces residual stress and avoids inadequate adhesion.



TSN Applied Using The Hard Masking Process

Observations / Comments

1. TSN applied using the Hard Masking System provides a much more uniform coating across the weld seams.
2. The Hard Masking System significantly reduces the thickness of the coating on the weld seam especially in the toe areas where the weld meets the deck plate.
3. Using the Hard Masking System provides a coating that is more strongly bonded in the toe areas of the weld seams as it is not being built-up on a foundation of poorly bonded overspray.

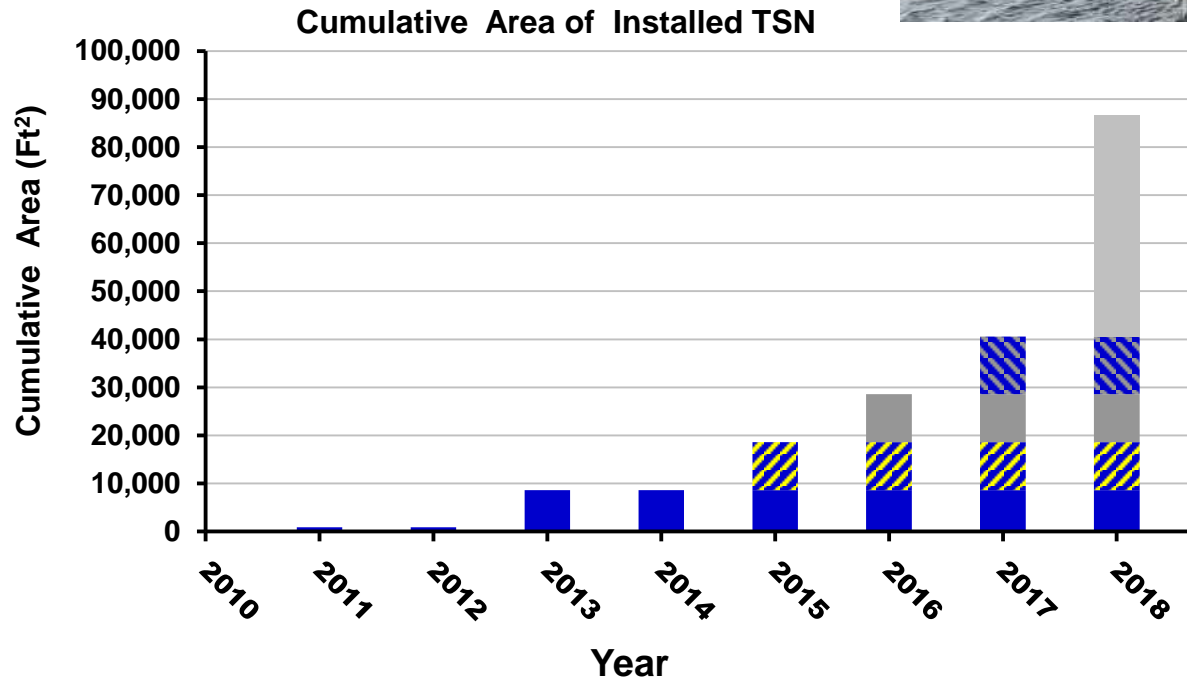
.068" .084" .065" .075" .067"

TSN Installed directly over weld after masking is removed produces more uniform thickness

[Group comments on adding lesson learned to Standard Item 009-124. Are thickness measurements requirements on welds adequate?](#)

Thermal Spray Nonskid Rapid Transition to Fleet Service

- NRL Developed TSN as part of ONR FNC program to withstand exhaust heat .
 - First TSN install in small patch in Apr 2011.
 - Recent installation on port side of foul line.
- Fleet interest in use of product expanded in 2014.
- NRL installed all TSN to date using R&D processes.



[All TSN installed since 2011 still in service, less than 1% needed repair, documents published to transition technology.](#)

Created New Composition Nonskid

Published MIL-PRF-24667C Interim Amendment 1 to Create Composition D Nonskid

- MIL-PRF-24667C, Interim Amendment 1, published by NAVSEA on 27 Mar 2018 on the ASSIST website.
 - Creates new, Composition D requirements for:
“Density-controlled abrasive deck system (composition D applies to Types I, V, and VII only)”
 - Composition D requirements based on empirical analysis of already qualified products.
 - Current requirements limited to changes that could be incorporated in an Interim Amendment.
 - Additional requirements will be included in [ongoing update to create MIL-PRF-24667D](#).
- Dec 2017 leadership direction to publish new Composition D requirements as soon as possible.

Composition G – General purpose nonskid.

Composition L - Landing zone nonskid.

Composition D – Density controlled nonskid.



[Flight Deck Readiness Working Group task to improve nonskid material to support operations.](#)

MIL-PRF-24667C Interim Amendment Created New Composition D Nonskid

TRANSITION TO FLEET SERVICE: Transition of Composition D products to Fleet service is complete and requires:

1. Publication of MIL-PRF-24667C Interim Amendment to nonskid specification that define Composition D nonskid requirements.
2. Update of ASSIST data base to include new Composition D qualified product database listing.
3. Publication of the FY-19, Change 2, Standard Item 009-32 to require Composition D nonskid on LHA, LHD, LPD, and LSD flight decks.

STATUS: Published MIL-PRF-24667C, Interim Amendment creating new, Composition D nonskid on 27 Mar 2018 that includes new requirements:

3.2.6 Aggregate density (composition D only). When evaluated in accordance with 4.5.30, the aggregate blend density value shall be between 0.6 and 0.9 g/cm³.

3.2.7 Aggregate hardness (composition D only). When evaluated in accordance with 4.5.31, the maximum hardness value of any aggregate type tested shall not exceed a rating of 6 on the Mohs scale.

TABLE XI. Weight.

	Grams per centimeter squared (g/cm ²), maximum	Pounds per square foot (lb/ft ²), maximum
Types I, V, VI, VII, VIII, and IX, Comp G & L	0.484	0.99
Types I, V, and VII Comp D	0.322	0.66
Types II, IV, and X	0.215	0.44
Type III	0.807	1.66
Type XI	0.30	0.62

4.5.30 Aggregate density (composition D only) The blend density of the aggregate shall be evaluated in accordance with ASTM D1895, method B. The aggregate blend density shall meet the requirement of 3.2.6.

4.5.31 Aggregate hardness (composition D only) A random sample of 5 grams of aggregate shall be selected, and if comprised of multiple aggregate types (e.g., polycarbonate and glass), separated by aggregate type. For each aggregate type, place a minimum of 3 grains of aggregate between two microscope slides. While wearing appropriate safety gloves and applying considerable finger pressure, slowly move one slide over the other with a reciprocating motion for 10 seconds. Examine the glass surface and if not scratched, the aggregate shall be considered to have a Mohs value of 6 or less. Repeat for each aggregate type previously separated. The samples shall meet the requirement of 3.2.7.

[Published MIL-PRF-24667C Interim Amendment on 27 Mar 2018 defining new Comp D nonskid.](#)

MIL-PRF-24667C Interim Amendment

Created New Composition D Nonskid Using Composition G Baseline

TRANSITION TO FLEET SERVICE: Transition of Composition D products to Fleet service requires:

1. Reviewed technical data on qualified MIL-PRF-24667C, Composition G nonskids.
2. Update of ASSIST database to include new Composition D qualified product database listing.
3. Update to the FY-19, Change 1, Standard Item 009-32 to require Comp D on amphibious ships.

STATUS: Published MIL-PRF-24667C, Interim Amendment 1 creating new, Composition D. Evaluated manufacturer's technical data and **qualification by extension** from Composition G to Composition D.

23 May 2018 - New Composition D products appear on ASSIST qualified products database.

The screenshot displays the Qualified Products Database (QP) interface. At the top, there are logos for the Department of Defense and the QP Database, along with navigation tabs: Main, Search, Reports, and Help. Below this, the governing specification is identified as MIL-PRF-24667C, updated on 11-MAY-2018. A search filter section shows 'Filter for: --NONE--' and 'Filter by: --NONE--'. The main results table has columns for 'Govt Designation', 'Source Name', and 'ORC Code'. Two products are listed:

Govt Designation	Source Name	ORC Code	Related Links
INTERSHIELD 5156LWT LIGHT WEIGHT NONSKID; INTERGARD 264 PRIMER, INTERTHANE 990, INTERTHANE 990HS, OR INTERLAC 800 COLOR TOPPING	INTERNATIONAL PAINT LLC 6001 ANTOINE DR HOUSTON, TX 770613503 USA http://www.akzonobel.com/International/ Test Reference: Int. Paint reports dtd 3/9/12, 8/9/11, 7/28/11, 7/19/17, 4/20/18, Ship Test USS CARL VINSON (CVN 70) 6/19/14; HHA LP Ser IH17000926 dtd 9/23/10 (Approved by NAVSEA Br 05S/2018-128 dtd 5/10/18)	02856	[Source POC] [Source Start] [Source Print]
MS-4100G LIGHTWEIGHT NON SKID; MS-7CZ (GRAY & BUFF) PRIMER; MS-200 CLR TOPPING	TIW POLYMER'S COATING'S NORTH AMERICA 130 COMMERCE DR MONTGOMERYVILLE, PA 189369624 USA http://www.flccastings.com Test Reference: LNI-7, SHD Test USS FLETCHER (DD-962), USS GEORGE WASHINGTON (CVN 73) NEHC 6261, Ser IH690326, 4/19/02, TIW letter dated 4/19/18 (Approved by NAVSEA Br Ser 05S/2018-129 5/9/18)	20420	[Source POC] [Source Print]

All nonskid manufacturers welcome to qualify Composition D nonskid with in-service evaluation on flight deck.

Standard Item 009-32 Update to Require Use Of New Composition D Nonskid

TRANSITION TO FLEET SERVICE: Transition of Composition D products to Fleet service is in progress and requires:

1. Publication of Interim Change to MIL-PRF-24667C nonskid specification to define Composition D nonskid requirements.
2. Update of ASSIST data base to include new Composition D qualified product database listing.
3. 26 Mar 2018 Published FY-19, Change 3, Standard Item 009-32 to require Comp D on LHA, LHD, LPD, and LSD flight decks.

STATUS: FY-19, Change 3, Standard Item 009-32, Table 2, Lines 16a to 16d show new requirements for Composition D nonskid

TABLE 2 STEEL SURFACES SURFACE SHPS	LINE	A SURFACE PREPARATION	B FINISH	C	D	E HORIZONTAL SURFACES: DECKS & FITTINGS	F MISTS & STACKS EXPOSED TO GAGES	G VERTICAL SURFACES
LHA, LHD, LPD, AND LSD FLIGHT DECK AREAS MINIMUM 12 MONTH SERVICE LIFE	16B	SAME AS LINE 9	SAME AS LINE 9	SAME AS LINE 9		ONE COAT DARK GRAY, MIL-PRF-24667, TYPE I COMP D SEE NOTES (16), (22), (26) (R), & (7)		
	16C	SAME AS LINE 9	SAME AS LINE 9	SAME AS LINE 11		ONE COAT DARK GRAY, MIL-PRF-24667, TYPE I COMP D SEE NOTES (16), (22), (26) (R), & (7)		
LHA, LHD, LPD, AND LSD FLIGHT DECK AREAS MINIMUM 30 DAY SERVICE LIFE	16D	SAME AS LINE 9	SAME AS LINE 9	SAME AS LINE 9		ONE COAT DARK GRAY, MIL-PRF-24667, TYPE VI COMP D SEE NOTES (16), (22), (26), & (R)		
EXTERIOR WALK AREAS (ALL DECK AREAS OTHER THAN WALKWAY DECK, FLIGHT DECK, & VERTICAL REFRESHMENT DECK AREAS) SEE NOTE (7)	17	SAME AS LINE 9	SAME AS LINE 9	SAME AS LINE 9		ONE COAT MIL-PRF-24667, TYPE I, V, VI, OR VII, COMP D OR ONE COAT DARK GRAY, MIL-PRF-24667, TYPE II, III, IV, COMP D SEE NOTES (16), (22), (26), & (R)		
	18	SAME AS LINE 9	ONE COAT PROPRIETARY NONSKID FINISH LISTED ON THE QPL FOR MIL-PRF-24667 TYPE I, V, VI, OR VII, COMP D, 4-0 MSL SEE NOTE (7)	ONE STRIPE COAT PROPRIETARY NONSKID FINISH LISTED ON THE QPL FOR MIL-PRF-24667 TYPE I, V, VI, OR VII, COMP D, 4-0 MSL SEE NOTE (7)		ONE COAT DARK GRAY MIL- PRF-24667 TYPE V, CLASS 2, GRADE B OR C, 2-1/8 MSL (4) APPLICATION OF MIL-PRF- 24667, TYPE VI, COMP D SEE NOTES (21), (24), (26) (7), & (8)		
	19	SAME AS LINE 9	ONE COAT MIL-PRF- 24667, TYPE V OR VI, CLASS 5, 4-0 MSL	ONE STRIPE COAT MIL-PRF-24667, TYPE V OR VI, CLASS 5, 4-0 MSL		SAME AS LINE 16		
	20	SAME AS LINE 9	ONE COAT MIL-PRF- 24667, TYPE VI, CLASS 5, 1/8- OR 1/4- IN MSL			SAME AS LINE 16		
	21	SAME AS LINE 16	ONE COAT MIL-PRF- 24667, TYPE V OR VI, CLASS 5, 4-0 MSL	ONE STRIPE COAT MIL-PRF-24667, TYPE V OR VI, CLASS 5, 4-0 MSL		SAME AS LINE 16		

Only TYPE I, COMP D products listed on ASSIST database authorized for application.

Note that the requirements do not apply to:

- Combatant flight deck
- VERTREP decks.
- Carriers.

New FY-19, Change 2, Standard Item 009-32, Table 2, Lines 16B & 16C requires LHA, LHD, LPD, and LSD flight decks use Type I, Comp D nonskid.

Spray Applied Polysiloxane Nonskid Flight Deck Nonskid Aluminum Flight Deck Surface Preparation

ISSUE: Jan 2011 – SWRMC and On Site Representatives (OSR) observe pitting on aluminum flight deck during nonskid removal/replacement.

- Pits up to 2 mm (79 mils) depth.
- Nonskid replacement with stainless steel shot wears away aluminum (e.g., <6 mils) and there is risk that ultrahigh pressure waterjet could cut aluminum.

Need to identify nonskid removal system that does not damage aluminum, but prepares surface adequately to support extended nonskid service life.



REQUIREMENT: FY-18, CH-1, Standard Item 009-32, Table 2, Lines 47 and 48 cite application of either MIL-PRF-24667C, Type I or Type V nonskid on flight deck and in hangar after surface preparation in accordance with:

“NEAR WHITE METAL BLAST USING GARNET, ALUMINUM OXIDE, CRUSHED GLASS, WALNUT SHELLS, OR STAINLESS STEEL SHOT - OR - WATERJETTING TO NACE/SSPC-SP WJ-2.”

Key risk is the degree to which any of these surface preparation steps will remove too much aluminum over the 20 year service life to damage the thin aluminum flight deck.

BACKGROUND: Vacuum waterjet cleaning is preferred nonskid removal tool and adding grit to waterjet cleaning system simultaneously removes nonskid and creates surface profile.

July 1992 – Waterjet Association Newsletter shows use of **36,000 psi** ultrahigh pressure waterjet at 1.5 gal/min flow with hand lance and fan tip to remove paint from thin aluminum aircraft floats.



26 Aug 1995 – Wu & Kim American Waterjet Conference paper on Al 6061-T6 waterjet cleaning substrate erosion found that at **20,000 psi to 30,000 psi** waterjet pressure, and at traverse speeds above 50 in/min, there was negligible metal loss.

Dec 2017 - SWRMC and OSR test effect of waterjet pressure on nonskid removal rates and deck scoring by the waterjet. Tested **15,000 psi – 38,000 psi** pressure at slow walking speed for the unit and there was negligible metal loss. **30,000 psi selected as optimal** pressure to remove nonskid without deck scoring.

Avoid waterjet cutting into thin aluminum deck



Plan is to use vacuum waterjet system with added abrasive grit to rapidly remove nonskid and create profile.

Spray Applied, Polysiloxane Nonskid Demonstration Installation

Goal is to Extend Service Life

PLAN: Demonstration installation of spray applied polysiloxane on aluminum flight deck in Oct - Dec 2018 with overall goal of creating a nonskid system that will:

- Remain dark gray throughout the service life (i.e., avoid fading/chalking).
- Remain intact / adherent to prevent deck corrosion for more than three years (i.e., no ridges and valleys to trap water).
- Extend nonskid functional service life to reduce number of times nonskid needs to be replaced over life cycle

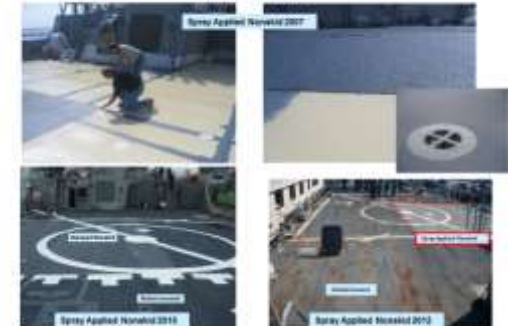


Demonstration will require departure to authorize the use of the spray applied polysiloxane nonskid because FY-19, Change 3, Standard Item 009-32 requires roller applied nonskid on flight decks.

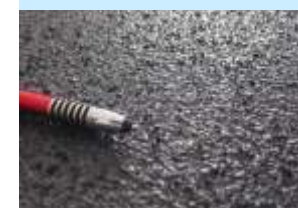
Key DFS provisions include:

1. NAVAIR to concur with use of spray applied nonskid on flight deck. DFS will cite precedent of USS ROSS (DDG 71) spray applied nonskid in 2007 and LCS 2 new construction specification. Spray applied decks do not have ridges from roller application, but satisfy MIL-PRF-24667C friction requirements.
2. Will require surface preparation using grit injected into <30,000 psi waterjet to simultaneously abrasive blast and remove nonskid (i.e., exceed the minimum 20% abrasive blasting requirement).
3. Will require two coats of primer for maximum corrosion protection.
4. Will mandate use of Siloxogrip nonskid system qualified in 2015 based on two years of service on USS THEODORE ROOSEVELT (CVN 71) and will be applied on LCS 12 using A-A-59982 positive displacement nonskid pump.

USS ROSS (DDG 71)
Spray Applied Flight Deck Nonskid Demonstration of Epoxy AST 440GLR
From 2007 to 2012



Spray Applied Siloxogrip



A-A-59982 Pump / Gun

Proposed demonstration installation to become baseline for future aluminum flight deck nonskid requirements.

MIL-PRF-24667C Specification Update Task

Update In Progress

- MIL-PRF-24667C, “COATING SYSTEM, NON-SKID, FOR ROLL, SPRAY, OR SELF-ADHERING APPLICATION” last updated on 22 May 2008. **Need update based on lessons learned.**
- NSWC-PD leading update project over next two years, with the following **objectives:**
 - Better define specific nonskid materials to allow Fleet to select products that satisfy performance needs.
 - Expand Types/Classes to reflect new material-specific performance requirements.
 - Reduce ship in-service testing to 18 months for all types and classes.
 - Add performance tests for heat resistant nonskids to Composition D.
 - Update Coefficient of Friction measurement processes.



[Update to conventional nonskid specification essential compliment to expanded TSN applications.](#)

Proposed MIL-PRF-24667C Specification Update

Shipboard Qualification of Composition D Nonskid

- MIL-PRF-24667C currently requires all nonskid materials to be qualified on a CVN flight deck.

Composition G - Today

- a. Wear-through showing the primer or steel deck;
- b. ASTM D660 checking rated less than 8;
- c. ASTM D661 cracking rated less than 8;
- d. Breaking (flaking);
- e. Loss of adhesion (peeling);
- f. COF values less than 80 percent of the initial value;
- g. Other deficiency which would adversely affect its performance.

Composition D - Tomorrow

FLIGHT DECK NONSKID QUALIFICATION
ON LHA/LHD

Retain current performance criteria

Add heat resistance requirements

Maintain Composition D density requirements.

Fixed wing



Arrested landing

Fixed and rotor wing

Exhaust heat



Vertical landing

[Nonskid materials experience different challenges on CVN and LHA/LHD; QPD to reflect all ship classes.](#)

Proposed MIL-PRF-24667D Specification Update

Utilize Type, Composition, Class, Application, and Grade to Define Nonskid

Proposed MIL-PRF-24667D Classification

Note: Type XI Peel & Stick going to new specification

Baseline Requirements

- ID characteristics
- impact resistance#
- flash point
- resistance to chemical solutions
- color
- condition in container
- pot life#
- fire resistance
- storage stability (accelerated and long-term)
- VOC content#
- HAP content
- metals content
- crystalline silica content
- toxicity
- directions for mixing and applying
- performance in-service#

indicates proposed modification eliminates distinguishing criteria

	Type	Composition	Class	Grade	Application
I	Standard durability, rollable (1)(2)(3)	Density controlled abrasive [Comp D] (12)(13)(14)	1 Standard	A One component	1 Standard cure
II	Standard durability, sprayable (1)(2)(3) (4)(5)(6)(7)(8)	G General use abrasive [Comp G]	2 Color stable (16)	B Two component	2 Fast cure (21) Ex-Type VII
X	Submerged, rollable (9)(10)(11)	L Limited use abrasive [Comp L] (15)	3 Low solar absorbent (17)		3 Low temperature cure (21)^ Ex-Type VIII
III	Submerged, sprayable (4)(5)(6)(7)(8) (9)(10)(11)		4 Resilient (9)(18)		
IV	Extended durability, rollable (1)^(2)^(3)^		5 Elastomeric substrate (19)		
V	Extended durability, sprayable (1)^(2)^(3)^ (4)(5)(6) (7)(8)		6 Low profile (20)		
VI					

Distinguishing Requirements

- (1) resistance to wear
- (2) resistance to accelerated aging by light and water
- (3) resistance to accelerated corrosion
- (4) coefficient of friction*
- (5) appearance of dried coating
- (6) application properties
- (7) coverage
- (8) weight
- (9) flexibility
- (10) immersion resistance
- (11) cathodic protection compatibility
- (12) aggregate density
- (13) aggregate hardness
- (14) temperature resistance*
- (15) abrasion of arresting cable
- (16) color stability*
- (17) solar reflectance*
- (18) adhesion of the intermediate coat
- (19) elastomeric testing**
- (20) low profile**

* indicates new, or significantly modified

^ indicates alternate criteria

% indicates government performed testing

Service and installation technique

Aggregate

Features

Number of components

Application temperature

Conclusions

- NAVSEA goal is to support USFF N43 Flight Deck Readiness working group by improving nonskid materials and processes.
- NAVSEA expanding applications for TSN and working to transition to standard, waterfront process.
- NAVSEA published Interim Amendment to MIL-PRF-24667C nonskid material specification to define Composition D products.
- NAVSEA to demonstrate new coatings and processes on aluminum flight deck.
- NAVSEA goal to work with NSRP and waterfront community to improve MIL-PRF-24667 nonskid specification.



QUESTIONS?